GOVERNMENT OF BANGLADESH

NATIONAL REPORT OF BANGLADESH

Prepared for IDNDR Mid-Term Review and 1994 World Conference on Natural Disaster Reduction

December 1993

CHAPTER - 1

1. OVERVIEW AND EXECUTIVE SUMMARY

1.1 Executive Summary

1.1.1 Bangladesh has an area of 55,000 Square Miles with a population of 112 Million. It has a flat terrain crisscrossed by rivers most of which cause flooding of the land during the monsoons (June - September). The coastal area is often ravaged by cyclones originating in the Bay of Bengal. River Bank erosion also causes disasters to populations living on the banks of some rivers. Tornado occurs quite frequently in the summer season in almost all districts of Bangladesh. In the recent years drought has been increasing due to shortage of water and rain in dry seasons in the Centre-West area of Bangladesh. Being in the seismic zone, the possibility of earthquake exists. Minor tremorous occur almost every year but no significant damage has occurred in this century.

1.1.2 Cyclone and Flood are the two main Natural Disasters which, in the recent years have caused colossal damage to lives and property in Bangladesh. The death toll in 1991 cyclone was about 140,000 and damage to property was of the order of several billion dollars. The flood of 1988 submerged more than two third of the total land of Bangladesh. The cyclone of 1970 killed about half a million people. An account of Major Natural Disasters in Bangladesh during 1644 to 1991 is at **Appendix - 'A'.**

1.1.3 The Disaster Mitigation Measures adopted by Bangladesh include the following:

a) Embankments in the coastal area and offshore islands to prevent on rush of tidal surge water;

b) Afforestation in the coastal area.

c) Road networks in cyclone prone area to facilitate evacuation and relief;

d) Construction of Cyclone Shelters;

e) Embankment on river sides in some area where flood water causes devastation; and

f) Raised earth platform in low lying areas which go under water during the flood season.

1.1.4 Preparedness Measures include

a) An organisation called CPP (Cyclone Preparedness Programme) having 26,000 volunteers covering all the coastal districts and having telecommunication network. Weather warning received through this communication system are passed to local population for warning them of the impending cyclone;

b) To increase awareness in the community, media is used. A massive training programme is about to be launched for improving the coping mechanism of the people; and

c) To prepare against flood disasters the population is warned earlier through the local administration who are kept informed of flood situation.

1.1.5 Warning Systems

Warning Systems are well developed in Bangladesh. The cyclone warning is issued by the Bangladesh Meteorological Department who obtains information through Satellite Imagery, Met area broadcast and two RADARs projecting about 400 miles into the Bay of Bengal. Flood warning is issued by the Flood Forecasting Centre of Bangladesh Water Development Board. Warning dissemination is carried out through the Telegraph & Telephone Department, Radio, T.V., CPP and local administration. In case of grave emergency all available telecom facilities including those of the Police and Military are also used.

1.1.6 Search and Rescue

The local administration is assisted by the Armed Forces, Police, other Para Military Forces and Volunteers in carrying out search and rescue.

1.1.7 Relief and Rehabilitation

On receipt of the damages (assessed by local administration) relief materials and equipment, medicine, medical teams etc. are despatched to the site. The NGOs also participate. The local administrations remain in charge of the overall relief and rehabilitation activities. However in case of severe disasters affecting large area/population, zonal coordinators are placed in the affected area to direct relief operations.

1.1.8 Institutional Arrangement

Institutional arrangement has developed over the past decades for improving disaster management. Previously the concept was to manage a disaster after it occurs. The management was mainly left to the local administration supported by central govt. in the form of resource allocation and policy guidance. With increase of frequency and magnitude of natural disasters in the recent years the Government has given increased emphasis in institutionalising disaster management making the following committees responsible for all aspect of disaster management in their sphere:

a) National Disaster Management Council (NDMC), headed by the Prime Minister (head of the Government);

b) Inter-Ministerial Disaster Management Co-ordination Committee (IMDMCC) headed by the Minister for Relief;

c) District Disaster Management Committee

d) Thana (Sub-District) Disaster Management Committee; and

e) Union (a cluster of about a dozen villages) Disaster Management Committee.

1.1.9 In May 1993 the Government has established a Disaster Management Bureau (with 64 Officers and staff) to co-ordinate all Disaster Management activities in the country i.e. Disaster Management Training, Disaster Warning, Warning Dissemination, Search, Rescue, Relief, Rehabilitation and Disaster Mitigation Projects (Identification, approval and implementation). The organisation of Disaster Management Bureau is given **Appendix 'B'**

A committee headed by Minister for Planning has been set up in 1992 for monitoring disaster mitigation and rehabilitation projects included in the Annual Development Programme (ADP).

1.2 Context and Country Specific Issues

1.2.1 In the recent decades, Bangladesh has been visited by natural disaster of very large magnitude. The cyclone of 1970 killed more than half million people. The death toll of 1991 cyclone was 1,40,000. The flood of 1988 submerged more than two third of Bangladesh which has as area of 55,000 Square Miles and a population 112 million. Major natural disasters devastating Bangladesh from 1644 to 1991 are listed in **Appendix - A** to this paper. It is in this context that the urgency of disaster mitigation, disaster preparedness and over all disaster management requirements are to be seen. The specific issues relating to Bangladesh confronting disaster reduction efforts are mentioned in the subsequent paragraphs.

1.2.2 <u>Geographical Situation</u>

Bangladesh is situated in the tropical latitudes (23°N to 26°N) with nearly 200 miles coast line facing the Bay of Bengal where tropical cyclone originates during the months of April through November. Due to the geostrophic and cyclostrophic force the cyclone paths invariably veer clockwise and hits some part of coastal belt of Bangladesh causing severe damage to lives and properties on both side of the cyclones path till the cyclone's energy is decipated over the land surface. At times the cyclone surge reinforced by high, tide may be 20 to 30 feet high, completely

completely overrunning hundreds of large and small offshore islands washing away people, cattle, houses and destroying most of the infrastructures.

1.2.3 The Problem of Evacuation During a Cyclone

There are several millions people living in the coastal area and offshore islands. Evacuation of these people in the face of a cyclone warning through desirable, is not possible for the following reasons:

a) Shortage of water transport for evacuation of large population from offshore islands;

b) Absence of roads to the newly formed coastal lands where cultivators settle as soon as newly formed land becomes fit for paddy cultivation;

c) One or two days before the cyclone the sea is too rough for water transport or air transport to operate;

d) The exacts point where the cyclone will hit the cost is not clear till few hours before it hits. Hence area to be evacuated can not be decided too early.

1.2.4 Problem of Cyclone Shelter

There are some newly accreted land or islands where people have reached and are living but the land is too soft for brick-construction. Thus there are many islands or newly formed coasts where there is no cyclone shelter. Even if cyclone shelters are there, it is impossible to accommodate all personnel of the area. Only a small population may be accommodated and most of the population still remains exposed to cyclone surge and strong winds.

1.2.5 Search and Rescue

Because of bad weather, shortage of transport, absence of road facilities, search and rescue at crucial initial hours are handicapped. In the 1991 cyclone many lives

perished after hours or days of struggle in water and mud but no rescue could reach them.

1.2.6 Evacuation during Flash Flood

Because of short notice, limited transport facility and bad weather, evacuation during a flash flood is not always possible in Bangladesh where road communication in flash flood prone are very poor.

1.2.7 Evacuation during very high Flood

When hundreds of thousands of people are marooned by flood waters, there remain hardly any high land in the vicinity where such a large population can be transported for safely.

1.2.8 The need for Cyclone Resistant Houses

The people living in the offshore islands and newly accreted coastal lands are mostly fishermen or labour force hired by Land Lords. The live in huts made of Bamboo and straw and do not have resources to build strong houses. High subsidy or interest free loans may motivate the well to do ones among them to build strong houses that can survive a cyclonic storm.

1.2.9 Raised Platforms as Flood Shelter

Bangladesh has a flat plain land. Only about 15% of its area has hilly terrain. Plain lands are, on an average, only 20 feet above near sea level. In the high riverfloods, thousands of square miles of land go under water and almost all structures including feeder roads, culverts and small bridges go under water. Even the houses go under water. In some area during a high flood, human beings and cattle do not have any dry land to stay on. They have to be evacuated to higher lands. But dry lands may not be in the area. Thus people and cattle need to be shifted miles away from their houses. Damage to houses, stock of rice including the seeds for next cultivation and other belongings makes the affected people

pauper and dependent on relief. This situation can be largely mitigated by having high platforms (raised lands) in the schools, bazars and growth centre where marooned people can take shelter.

1.2.10 Embankments for Flood Protection

Millions of acres of paddy fields go under water during the monsoon season. Some rice plants can grow with the rise of water in a normal flood. But their growth can not cope with sudden rise of water in a high flood. As a result paddies are destroyed in a high flood. Flood protection embankments are required in many districts of Bangladesh for protection of crops. Some have been made but because of resource constraints a lot still remains to be done in this area.

1.2.11 Drought in Centre-West Bangladesh

All the rivers flowing through Bangladesh originate in India. India has made many barrages on these rivers diverting waters to irrigate her dry lands. As a result the rivers in Bangladesh has little water in dry season. The water level in dry season goes so much down that a process of desertification has started in Centre-West area of Bangladesh. This is mainly due to Farakka Barrage on the mighty Ganges which is reduced to a small water channel in the Bangladesh portion in summer. The result is a drought condition in 20% area of Bangladesh. This is a recent phenomena and it can be avoided by allowing a reasonable share of Ganges water to Bangladesh.

1.2.12 River Bank Erosion

This is another disaster factor in Bangladesh. Because of low water flow in dry season rivers are silted. In flood season river swell up with water from the hills and rain water. The high pressure on the bank causes erosion of the bank of the rivers causing complete washing away of hundreds of squire miles of land within few weeks. Human settlements in these lands disappear within days and the population become homeless. The govt of Bangladesh is forced to spend Millions of Dollars every year in an effort to prevent river bank erosion specially in the area of dense population.

CHAPTER 2

RISK ASSESSMENT

2.1 Hazard Assessment

2.1.1 Meteorological Hazards

a) Cyclone

Tropical cyclones originating in the Bay of Bengal hit the coast of Bangladesh every year. On an average about a half a dozen cyclones of small magnitudes visit during the month of April through November. Devastative cyclones associated with tidal surge of 20' - 30' feet height occurs once in several years. About 15 coastal districts are in the cyclone prone area. On both side of the track of the cyclone at least 6 districts with population about 9 million is affected in a devastating cyclone.

b) Flood

During monsoon seasons snow melted water from the Himalayan and rain waters together cause sudden overflow in the rivers causing floods in Bangladesh.

c) Tornados

During summer season tornado's sudden occurrence in most districts are a common phenomena. These Tornadoes destroy everything on its way; even large trees are uprooted and tin roofs of houses are lifted and taken far away causing deaths of men and cattle. There are several hundred such occurrences every year in Bangladesh.

2.1.2 Geographical Hazards

Bangladesh is in the seismic zone but earthquakes are infrequent. Even if some tremor occurs they are not damaging. Although disastrous earthquake occurred in

the neighbouring Indian state of Assam (East) and Bihar (West), Bangladesh itself has not experienced any disastrous earthquakes in the last 100 years. Volcanic eruptions are not existent; there is no volcano in Bangladesh. Landslide of small magnitude occurs during rainy season in the small earthen hills but no severe damage is caused.

2.1.3 Wild Fire

The forest area in Bangladesh is small. Tropical forest of several hundred squire miles are in hills and in three coastal districts (Sunderbans). The occurrence of wild fire is rare.

2.1.4 Drought

As explained in para 1.2.11. drought is a recent phenomena in Bangladesh. Excessive lifting of waters from rivers by the upper riparian country is keeping the rivers in Bangladesh dry in the dry season. This is causing low water table in the vicinity of these rivers and creating draft conditions there. A slow process of desertification has started. To prevent this it is necessary to ensure that a reasonable portion of waters of these international rivers are allowed to reach Bangladesh.

2.2 Vulnerability Analysis

2.2.1 Population

a) Vulnerability to Cyclone : About 33 million people live in the cyclone prone area. In event of severe cyclone about 9 million people become vulnerable on both side of cyclones path. About 20% of the vulnerable people live in the offshore islands or newly accreted coastal lands where there are no cyclone resistance house. Evacuation of such a large population is not possible (explained in Para 1.2.3). Even if there are Shelters the women and children hesitate to leave home without decision from the head of the family (usually day labours, farmers or fishermen. In Bangladeshi culture a woman does not

leave the house without her husband's permission. Thus it the women and children suffer most in the event of a cyclonic storm and tidal surge. Population casualty is high in cyclone mainly because of the lack of facilities for evacuation to safe area;

b) Flood : Again the vast population which is affected by flood in any area can not be evacuated for lake of transport facilities and the reluctance of affected people to leave home for fear of losing their belongings to be left behind. More over, when evacuation is required there hardly any high place nearby. In extreme cases however, when water enters into the houses and reaches middle or top of the houses, people leave. In such situation relief camps are set up for the distressed people where they stay till flood water recedes.

c) River Bank Erosion : At times river banks erodes so quietly that within few days an entire village may go into river. The homeless people are generally sheltered in safer area with local administration finding out alternative places as temporary shelter for the homeless people.

2.2.2 Vulnerability due to Social and Cultural Peculiarity

In Bangladesh Society generally men work outside and women work at home (Barring a small percentage of educated women who have started taking up outside works). In case of emergency women suffer being unable to take instant decision in the absence of husband or the master of the house. Being very religious, people are mostly great believer of fate and take calamities and set backs as God's dispensation. By and large people are used to natural calamity and therefore they face natural disasters with calmness and courage

However, people are basically intelligent and if they are educated on disaster preparedness and guided to take appropriate mitigation measures, their suffering through natural disasters can be significantly reduced.

2.2.3 Facilities/Infrastructures

a) Shelters : During last 22 years about 387 cyclone shelters have been built in the high risk areas. 199 are under construction and 339 are proposed to be constructed. The Government plans to build 2,000 cyclone shelters by end of the century;

b) Embankment : Embankments have been built in the offshore islands and coastal area for protection of the settled area from tidal surge and also to protect paddy fields from saline waters. Flood protection embankment have also been built in many areas inland. However, much more need to be done. Resource constraints do not make it possible to build all the required embankments;

c) Afforestation : A green belt in the coastal area is planned. Few projects for afforestation in coastal area have been completed during the last two decades. some project are now in pipeline for carrying out afforestation. Some are in the study stage;

d) Roads : Roads are required in the cyclone prone area for pre-cyclone evacuation and post-cyclone relief. Large network has been planned; progress in construction of these roads are slow due to resource constraint;

e) Strong houses : Both for cyclone and flood prone area, strong houses are desirable. However the people living in these areas can not afford them in most cases. Subsidy or interest free loan may encourage people to build strong houses.

2.2.4 Economic/financial factor. Poverty makes people vulnerable to disaster for may reasons. These are inability to build cyclone resistance houses, poor purchasing power (clothes, food, medicine etc), malnutrition, disease, inability to rehabilitate themselves in terms of housing, agriculture, fisheries etc.

At local administration level also relief camps cannot be run too long for shortage of fund.

At the national level the disaster mitigation projects and rehabilitation of disaster affected people can not be given due priority because of competitive demands on national resources for various priority sectors.

CHAPTER 3

MITIGATION ACTIVITIES

3.1 Land use Planning, Water and Forest Resources

3.1.1 Land use Planning

In order to reduced effect of cyclone in land coastal afforestation has been planned some afforestation project have been already implemented in the coastal area and few offshore islands. These will help absorption cyclone storms energy and weaken the cyclone on land after crossing the forests on the coasts.

3.1.2 Water

Embankments in offshore islands, coastal area and on some river banks have been built. More are planned for protection against flood (in land) and against tidal surge (coastal area).

3.1.3 Forest Management :

The tropical forest (Sunderbans) in the coastal districts of Bagerhat, Khulna and Satkhira helps in absorbing its energy as it passes over the forest. This Government takes great care for ensuring it preservation in spite of tremendous pressure on land and forest because of high population in Bangladesh. Forest tree filling is prohibited and the Departments of Forest is making efforts to expand forest area all over Bangladesh through new plantations.

3.1.4 Building Codes and Practices

Building Code exists and are followed. Recent experience of structural failures of embankments, roads and culverts due to high pressure of flood water has give added emphasis on following building codes. Environmental Impact Assessment

(EIA) has been introduced in case of large construction projects.

3.1.5 Preparedness and Planning

Standing Orders for Flood and Standing Orders for Cyclone was issued by the Govt. respectively in 1984 and 1985. Recently the two have been merged into a **Disaster Standing Order.** Thana and District Action Plans covering disaster preparedness are being made. Guidelines have been issued. Emergency Food and Emergency Medicines are stored at Thana level. Even the Unions (about a dozen village administrative unit) are required to have disaster committees. Recently an act of parliament has made this provision.

Disaster Mitigation Projects are planned by the various Agencies/Departments. Then it is planned and processed by the Planning Cell of concerned Ministries/ Divisions. At the level of Planning Commission and approved by the National Economic Council. A large number of mitigation projects (Cyclone Shelter, Embankment, Jetties, Roads, Telecommunication etc.) are now under implementation. These will contribute to the achievement of IDNDR objectives.

3.1.6 Awareness and Training

A three year programme on public awareness and training is scheduled to start on 1st January 1994. The project will cost about 5 million dollar and cover the cyclone and flood prone districts gradually. The NGO will be associated with this programme. All major training institutions will be used for the training the trainers and government officials deployed in the field for technical and general administrations.

3.2 Issues

3.2.1 Research

There has not been much research on cyclone in Bangladesh. Some studies have been carried on gender issue in the context cyclone disaster, some research from

Meteorological view point has been made. On the issue of Flood, there has researches by MPO (Master Plan Organisation) of Water Development Board, River Research Institute and recently by FPCO (Flood Plan Co-ordination Organisation). The FPCO has undertaken 26 studies costing about US$ 90 million on various aspects of flood control and mitigation in Bangladesh. Some of these studies have been completed and the rest will be completed by 1994.

3.2.2 a) Cyclone can not be prevented but its effect may be reduced by preparedness and mitigation measures. Within this parameter risks are unavoidable. New lands in the coast and offshore islands will attract cultivators who consider the risks acceptable in the context of their livelihood. Similarly fisher men go to the high sea accepting the risk of being destroyed. The fishing boats carry radio and are advised, in advance about when to return or stay in safe shelters;

b) Flood in Bangladesh has a different dimension. Flood brings alluvial soil which fertilises lands and gives better crop. Flood is a part of life in Bangladesh and people are used to live with it. What is required is the mitigation measure to reduce the adverse effects of high flood. The risk is considered acceptable and unavoidable.

3.2.3 Public Health

Dense population, low income and poor living condition makes people highly vulnerable to disease/epidemics after a disaster. The main reason is scarcity of safe drinking water immediately after a disaster. Both flood and tidal surge chokes the tube wells and contaminates the water in ponds or rivers. Therefore public health is in serious jeopardy after a flood or cyclone. Govt. keeps ready medical teams and medicine to tackle any epidemics that may occur; NGOs also come forward for help.

3.2.4 Cost Effectiveness

When an embankment breaches, a bridge is washed away, a jetty collapses or a road is washed away or house/office buildings are destroyed by tidal surge or flood, the damage is colossal. The resources diverted for the repair/rehabilitation of these damaged structures up sets the development plan efforts. Massive afforestation in coastal area may protect many of this structures by reducing the impact of cyclone. Strong construction of structures may also reduce damages. Therefore if Bangladesh spends more resources in making flood proof or cyclone proof structures and other structural mitigation measures it may, in the long run, help in her development effort. Investment on mitigation measures is thus investment on development. Of course the investment will be limited by consideration of cost effectiveness. Most of the present mitigation measures are cost effective in view of their long term economic benefit to the society

3.2 Responsibilities/Enforcements

The responsibilities for disaster management at various level rests with the following committees:

a) National Level

i) The National Disaster Management Council (NDMC) chaired by the Prime Minister (Head of the Govt)

ii) The Inter-Ministerial Disaster Management Co-ordination Committee (IMDMCC) headed by the Minister for Relief.

iii) IDNDR National Committee (Chairman : Minister for Relief (Appendix - C1)

b) District Level

i). District Disaster Management Committee headed by the District Administrator (Deputy Commissioner);

ii) District IDNDR Committee (Chairman : Deputy Commissioner) (Appendix - C2)

c) Thana (Subdistrict) level

i) Thana Disaster Management Committee

ii) Thana IDNDR Committee (Chairman : TNO) (Appendix - C3)

d) Union

The Union Disaster Management Committee.

These committees are fully functional at present and are responsible and enhance for doing everything required for disaster preparedness, Response, rehabilitation and mitigation.

CHAPTER 4

WARNING

4.1 System for Observing, Forecasting and Warning

4.1.1 a) Cyclone Warning

Bangladesh has two weather station at Cox Bazar and Khepupara. These are recent acquisition projecting about 400 miles into the Bay of Bengal to watch any development or movement of cyclonic storms. There are weather broadcast from meteorological observation station in the region. SPARRSO (Bangladesh) and Satellite observation are the other source of weather report. The storm warning centre of Meteorological Department of Bangladesh, initiates warning of any advancing cyclone and tornadoes through Telephone and Telegram Department, Radio Station, TV Stations other media and CPP for warning dissemination. The CPP (Cyclone Preparedness Programme) is an organisation set up in 1973 in the coastal area of Bangladesh covering several districts. Its thana centres are connected with Dhaka through telecommunication network. On receipt a cyclone warning the CPP volunteers (26,000 in numbers) goes out on cycle and use megaphone to warn villagers of the advanced cyclone. T&T channel is used to pas cycle warning to all local officials who also hear from TV and Radio. A control room at the Disaster Management Bureau of Ministry of Relief also sends messages and instructions to local administration in the event of a cyclone emergency.

b) Flood Warning System

The Flood Forecasting and Warning Centre of Bangladesh Water Development Board issues warning of flood through daily bulletins from the Month of May till November. This includes water level in the river and tends in the rise and fall of water level at various point in important rivers. The warning about rainfall which affect flood also, is issued by Meteorological Department.

The Disaster Management Bureau also issues daily bulletins when flood reaches disaster condition any where in Bangladesh. It also covers relevant information such as area flooded, crops damaged, people affected/threatened, relief given epidemics, death etc.

4.1.2 There is no established system of issuing warning for Geological, Drought, Wild Fire and Locust infestation as these kind of disasters are rare in Bangladesh.

4.2 Evaluation of Warning System (Dissemination, Interpretation and Institutional issues).

4.2.1 Cyclone warnings system, as far as the accuracy of forecast concurred, is excellent in Bangladesh. Warning dissemination had some deficiency for primitive nature of communication (by telephone) from storm Warning Centre to the Radio Station. With the introduction of Fax all important recipients of Met Warning are now given Warning Text through Fax resulting in quick and accurate transmission. Dissemination through T&T Dept to local administration is also satisfactory. However the actual text which is broadcast for general public is too technical for a layman. This defect is now widely appreciated and a committee has been set up recently to review the warming format.

4.2.2 The flood warning system also suffers some defects. The warning issued by the Flood Forecasting and Warning Centre of BWDB is in the form of a long narrative distributed to concerned govt. offices only. The public gets the warning through radio, TV, or News Papers. The accuracy is seriously handicapped due to lack of data on rainfall and water level in the catchment area. As mentioned earlier, most of the rivers originate in India and data in on the India Portion of rivers are necessary for accurate forecast. In the current year (1993) very little data was supplied by India during the flood season.

CHAPTER 5

INTERNATIONAL COOPERATION

5.1 Status

5.1.1 a) Weather data exchange: Good cooperation with neighbouring countries exist on the exchange of normal weather data on wind, temperature, cloud base etc. Bilateral agreement exists on exchange of data on water level and rainfall in the catchment of rivers entering from India to Bangladesh. But data has not always been sent this year from the Indian observation posts.

b) Agreement on sharing of Ganges water between Bangladesh and India has expired.

5.1.2 Issues

a) In the interest of accuracy of flood forecast in Bangladesh water level and rainfall data from India is necessary;

b) The only way to prevent desertification and droughts in Central-West area of Bangladesh is to ensure that Bangladesh receives a reasonable share of water from the Ganges through the Farakka Barrage. An agreement between India and Bangladesh on sharing of the Ganges river water is necessary to avert this diaster in Bangladesh.

CHAPTER 6

OVERALL EVALUATION AND FUTURE PROGRAMME OF IDNDR ACTIVITY

6.1 Goals and Achievements

6.1.1 National Assessment of Risks

The government has identified the natural hazards which pose disaster threat. An evaluation of the geographic distribution of these hazards have been made and Hazard Maps of Bangladesh has been published in June 1993. A total of eight type of maps each showing a particular disaster has been printed. These are:

a) Areas affected by cyclone;

b) Areas affected by flood and River Bank Erosion;

c) Earthquake zones;

d) Areas affected by Tornadoes

e) Bangladesh Hazard Indices

f) Thana Hazard Indices

g) Coastal Area Physical Infrastructure. This map shows Embankments, Roads, Rivers, Cyclone Shelters, Afforestation and other Infrastructures relevant to Disaster Management

The maps have been coloured to indicate intensity or frequency of recurrence of the disasters.

Vulnerability of most important concentration of people and resources in the cyclone prone are has been assessed. But in case flood and other disasters such assessment has not yet been done.

These assessments have been taken into account in the Natural Development Plan. Disaster mitigation projects (on Afforestation, Embankments, Roads, Cyclone Shelters, Telecommunication etc.) have been included in **Annual Development Programme (ADP)**. These projects are targeted for completion within the Decade (IDNDR).

6.1.2 Natural and Local Prevention and Preparedness Plan

a) Land use and Construction Practices to resist or avoid hazards are being adopted. Environmental Impact assessment (EIA) has been made mandatory in case of large projects. DIA (Disaster Impact Assessment) has been proposed. This is yet to be enforced;

b) Emergency Response plan at Thana and Union level are being formulated. Guidelines for such plans has been issued. Standing Orders for Cyclone and Flood exists. These two are being merged into a Disaster Standing Order which covers emergency actions to be taken at all levels from Ministry, District, thana (sub-district) down union level during normal time, warning phase, during a disaster and during post disaster rehabilitation. National and local level committees have been made responsible for taking necessary steps in the event of a disaster;

c) A Public Awareness and Training Programme for three years (1994, 95 and 96) has been planned to be implemented through a project name comprehensive Disaster Management programme costing about 5 Million US Dollars to be provided by UNDP/UNICEF/USAID/UKODA;

d) 387 Cyclone Shelters have been built, 199 are in the process of construction; and 339 are proposed for construction by various agencies. The target is 2,000 cyclone shelters by the year 2,000.

6.1.3 Global, Regional, National and Local Warning System.

a) As narrated earlier, a highly satisfactory warning system for cyclone warning exists. The storm warning system is capable of predicting cyclones weeks earlier and give firm warning with about 72 hours lead time. Global satellite imageries are available from various sources for a accurate warning of cyclone. This is sufficient time to activate coping mechanism.

b) The telecommunication system to disseminate warnings are will developed. However, some population offshore islands are yet to be brought under the communication network. The 26,000 CPP (Cyclone Preparedness Programme) volunteers help in the dissemination of warning in the villages in the cyclone prone area.

c) Perception of Hazards by Authorities

Repeated occurrence of National Disasters of great dimension causing deaths of large population and devastation of far reaching consequence have made people of Bangladesh, specially the decision makers aware of the Hazards, their consequence and need for preparedness for and effective response to such disasters. The three training and public awareness programme also include workshops/seminars for senior policy makers for perusing and advocacy so that they give positive supports in Disaster preparedness and funds for implementing disaster mitigation projects. One the whole, the official in the top echelon are aware of the steps required to achieve the IDNDR objectives.

6.2 Expectations and Plans for Second Half of the Decade

a) The three year training and Public Awareness Programme (1994-1996) will continue till the end of the Decade and perhaps beyond till all districts of Bangladesh is covered;

b) Cyclone shelters and flood protection platforms (raised grounds in low lying areas) will be built consistent with resource availability;

c) Road and water transport facility in the disaster prone are will be improved further;

d) Telecommunication network will expanded to cover more offshore islands;

e) More through Emergency Preparedness and Response Preparedness response plan will be made. A system of exercising the plan is being introduced;

f) A disaster handbook is being prepared for use by all concurred;

g) Legal provisions on disaster management are being revised;

h) The Disaster Management Bureau, established in May 1993, will be strengthened, equipped and provided with facilities for better co-ordination/planning of disaster mitigation projects, emergency preparedness, response and rehabilitation.

Appendices:

'A' - **Major Natural Disasters in Bangladesh**

'B' - **Organisation of Disaster Management Bureau (Established in May 1993)**

'C' - **Constitution of IDNDR Committees at different levels.**